

**WARREYUS, A NEW GENUS OF EXOEDICEROTIDAE
(CRUSTACEA, AMPHIPODA) BASED ON *EXOEDICEROS*
MACULOSUS SHEARD**

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ABSTRACT: *Exoediceros maculosus* Sheard 1936 is placed in a new genus *Warreyus* in the family Exoedicerotidae created by Barnard and Drummond (1982). A second species, *W. latrans* (Haswell 1879), is also described.

Exoediceros maculosus (Sheard 1936), an oedicerotid amphipod described from southern Australia, differs in more than 25 characters from the type species of *Exoediceros*, *E. fossor* (Stimpson 1856), and is transferred to a new genus. The new genus is assigned to the Exoedicerotidae, a family created by Barnard and Drummond (1982) for several oedicerotids in the Southern Hemisphere characterised by apical spination on the rami of uropods 1-2.

A second species, *W. latrans* (Haswell 1879), is added to *Warreyus*. It can be considered a sibling species, almost cryptic, as it differs from *W. maculosus* in several minute characters of qualitative value.

LEGENDS

Capital letters to the lower right of each figure denote the following: A, antenna; B, brood plate = oostegite; C, coxa; D, dactyl; E, epistome, left lateral; F, accessory flagellum; G, gnathopod; H, head; I, inner plate or ramus; J, incisor; K, ventral aspect of urosomite; L, labium; M, mandible; N, molar; O, palp; P, pereopod; Q, pleopod; R, uropod, S, maxilliped; T, telson; U, labrum; V, calceolus; W, pleon; X, maxilla; Y, lacinia mobilis; Z, gill. Lower case letters to the left of capital letters refer to specimens so designated in the text. Lower case letters to the right of each capital refer as follows: f, left; p, peduncle; r, right; s, setae removed.

SYSTEMATICS

Family Exoedicerotidae

Genus *Warreyus* nov.

ETYMOLOGY: Latinised masculine version of an aboriginal word meaning "to follow", in reference to the apomorphic condition of this genus relative to *Exoediceros*.

DIAGNOSIS: Body not carinate. Rostrum acute, long. Eyes paired, separate. Article 3 of peduncle of antenna 1 half or less as long as article 1. Fully articulate, scale-like accessory flagellum present. Primary flagellum of antenna 1 with articles of diverse size and armament. No articles of antenna 1 especially swollen. Mandibular incisor projecting, toothed; molar of moderate size, triturative; palp 3-articulate, article 2 straight, article 3

falciform. Inner lobes of lower lip distinct, separate, fleshy. Plates of maxilla 2 similar in size and shape, outer plate lacking thick spines. Coxae setose in part though setae short, coxa 1 ventrally truncate, coxae 3-4 rounded below, coxa 4 subrectangular, scarcely excavate posteriorly, not lobate. Gnathopods alike in both sexes, subchelate; wrists weakly lobate, not guarding hands; palms oblique, hands lacking dense fields of spines near apex of closed dactyl. Dactyls of pereopods 3-4 (and 5-6) obsolescent. Gill on coxa 5 large. Article 2 of pereopod 7 expanded and lobate. Uropod 2 not reaching far along uropod 3; peduncle of uropod 3 long, with small marginal spines, rami long. Telson entire.

TYPE SPECIES: *Exoediceros maculosus* Sheard 1936.

COMPOSITION: *Oedicerus* (sic) *latrans* Haswell 1879.

RELATIONSHIP: The two species of *Warreyus* here described differ from *Exoediceros fossor* (the only known species in the genus *Exoediceros*) in a number of different characters of which the following are considered to be of generic value: 1, the diverse size of articles and armaments on the primary flagellum of antenna 1. 2, the similarity of gnathopods 1 and 2 in both sexes and lack of gnathopodal sexual dimorphism. 3, the ordinary size of the gill on pereopod 5 (which, in *E. fossor*, is minute). 4, the subequal plates of maxilla 2 (in *E. fossor* distinctly different in size and shape). 5, the presence, on the hands of the gnathopods, of 3 or 4 rows of sharp, thin spines in place of the uniserial fields of thick, blunt spines in *E. fossor*. 6, the shape of article 3 of the mandibular palp. 7, the long, acute rostrum. Other differences are listed below in the discussion of the relationships of *W. maculosus*.

PROBLEMS OF IDENTIFICATION: Uropod 3 falls off many preserved specimens, and the apex of pereopod 7 is often missing, but the crucial generic characters such as the long acute rostrum, plus attributes of antennae, gnathopods and mouthparts, are retained. Juveniles are striking because the coxae are so poorly armed.

The two species described are easily distinguished by the presence or absence of anterior armaments on article 6 of pereopods 5-6.

Key to the species of *Warreyus*

1. Article 6 of pereopods 5-6 with all armaments grouped together posteriorly either on face or posterior margin; dactyl, though vestigial, visible and

larger than that of next couplet *W. maculosus* (Sheard)

Article 6 of pereopods 5-6 with armaments divided into two parts, mostly posterior but anterior margin with row of strong spines and setae, dactyl obsolescent and invisible except under highest magnification *W. Latrans* (Haswell)

Warreyus maculosus (Sheard 1936)

Fig. 1

1936 *Exoedicerus maculosus* Sheard, p. 452, figs 3, 4 (part).

DIAGNOSIS: Coxae 1-4 with setae long and divided into groups, posterodorsal group composed of thick curved elements, ventral group thin and flexible; article 6 of pereopods 3-4 and 5-6 distinctive; on pereopods 3-4 some facial spines forming an anterior row, thus spines in ranks of about 3-4 and 1, on pereopods 5-6 all spines together in ranks of about 4 and 0, with no spines separated into marginal row; dactyls of pereopods 3-4 obsolescent, of pereopods 5-6 much larger and visible; lateral tooth of urosomite 1 small or obsolescent.

DESCRIPTION OF LECTOTYPE (female "a" 6.45 mm, South Australia): Uropod 3, apices of pereopod 7 and of flagella of antennae 1 and 2 missing from specimen. General body form like *Exoedicerus fossor* (Stimpson) as shown by Barnard & Drummond (1982, fig. 1); rostrum acute, elongate, reaching almost to apex of article 1 on antenna 1 but head otherwise not galeate, lateral lobes narrow and submillimilliform, anteroventral corner of head obtusely angled softly; eyes large, paired, each with massive pigment core but periphery ommatidia (from lateral view) unpigmented.

Antennae of medium length, 2 longer than 1, articles of flagella short and bead-like, proliferate, widened and lobed alternately only on antenna 1; peduncle of antenna 1 short, articles 2-3 successively shorter than article 1, all three sparsely spinose and setose; peduncle of antenna 2 also short, articles 4-5 subequal, article 3 short, all three sparsely spinose and setose; accessory flagellum uniarticulate, small, scale-like; main flagellum of antenna 1 with complex arrangement of calceoli, swollen articles and aesthetascs; generally beyond article 12 every third article of maximum turgidity and bearing large calceolus and aesthetasc, intervening 2 articles narrower, bearing minute calceolus and no aesthetasc; first 3 basal and articles 5, 7, 9, 12 swollen, each generally with 1 aesthetasc, aesthetascs alternating in zig-zag fashion from posterior to anterior position on medial face of apex of each article, but after article 9 pattern changing to 2 articles in sequence with anterior and middle calceolus each followed by one with posterior calceolus; thus, when 0=no calceolus, p=posterior calceolus, m=middle calceolus, a=anterior calceolus, and each number marks one article, the formula for antenna 1 of female "a" is as follows: 1-0, 2p, 3p, 4m, 5p, 6m, 7p, 8m, 9p, 10a, 11m, 12p, 13a, 14m, 15p, 16a, 17m, 18p, 19a, 20m, 21p, . . . to article 53, then broken; all articles with calceolus swollen and bearing aesthetasc except articles 12 and 33 with 2 aesthetascs; antenna 2 formula=1-0, 2a, 3a, 4a, 5a, 6a, 7p, 8a, 9a, 10p, 11a,

12a, 13p, 14a, 15a, 16p, 17a, 18a, 19p, 20a, 21a, 22p, . . . 25p, . . . 28p, . . . 54p, broken.

Calceoli generally of oedicerotid form 7 (Lincoln & Hurley 1981), but differing from those of *Exoedicerus fossor* in the much smaller size, proximal receptacle being larger than part beyond waist, both receptacular elements being complexly sculptured.

Epistome with strong angular projection anteriorly, upper lip symmetrically rounded below. Incisors toothed, oblique blade, finely and evenly dentate, separating large teeth at either end; right lacinia mobilis narrow, broadening irregularly at apex; left lacinia mobilis with 7 teeth; right and left sides each with 7 stout rakers and one rudimentary; molar not very stout, subcuboid, moderately triturative; palp of medium thickness, article 1 short, article 2 weakly expanded, strongly setose, article 3 thinly falciform, longer than article 2, setae=ADE. Lower lip like illustration of *W. latrans*. Inner plate of maxilla 1 densely setose, with 9 intact setae and 2 sockets (=probably 11 setae) widely spread on right, left inner plate missing; outer plate with 11 spines; palp moderately spinosetose, 2-articulate. Plates of maxilla 2 of medium breadth, subequal, inner with full oblique facial row of setae. Plates of maxilliped small, inner with medial margins appressed and bent orally, setose, apices each with 2 stout medial spines and one more slender, subapically (=3 spines) and several larger stiff setae more laterally; outer plates not much larger than inner, medially spinose; dactyl unguiform, with 2 small subapical accessory setules.

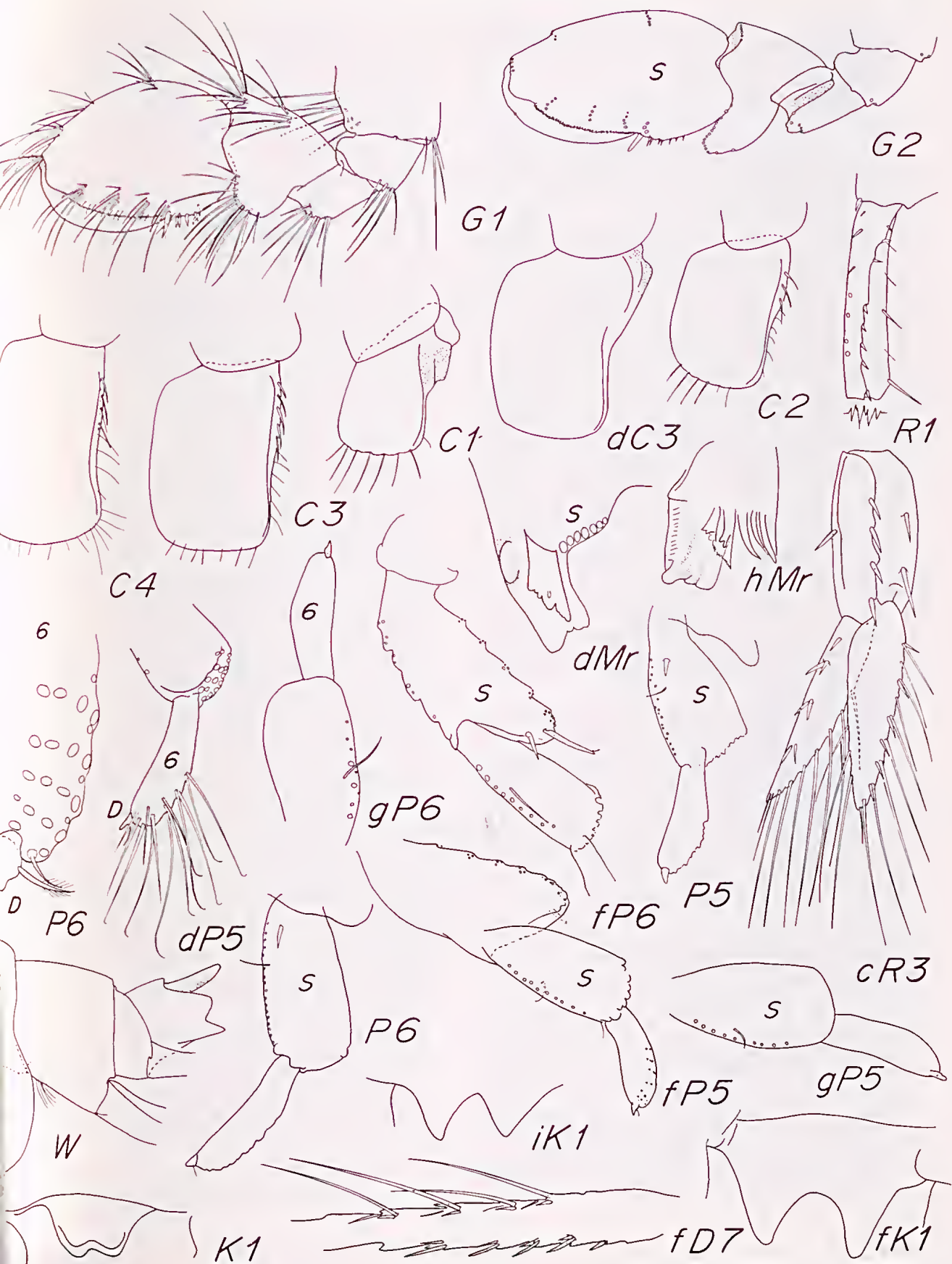
Coxa 5 scarcely shorter than coxa 4; coxa 1 truncate, with long ventral setae; coxae 2-4 all strongly setose posteriorly, proximal setae very stout; coxa 4 scarcely excavate and lobate posteriorly; coxae 5-7 with small to medium setae, setal formula of coxae=5-5-1.

Gnathopod 2 slightly larger than gnathopod 1, article 4 rather more produced and article 5 with larger lobe than in *W. latrans*, both gnathopods slightly twisted in preserved specimen.

Article 6 of pereopods 5 and 6 without anterior marginal setae, all facial setae posterior; dactyls of pereopods 3-4 vestigial, scarcely as thick as and much shorter than neighbouring spines, each dactyl with large setule; dactyls of pereopods 5-6 much larger (illustrated); article 2 of pereopods 5-6 with midfacial ridge, and of pereopods 5-7 with anterofacial ridge; article 5 of pereopods 5-6 with one basofacial spine and one facial submarginal spine-seta at about M45; dactyl of pereopod 7 unknown, broken off. Gills present on coxae 2-7, unpleated, with transverse capillaries; gills of coxae 2-5 chisel shaped, on coxae 6-7 folded and projecting medially into brood space like dried leaves. Oostegites on coxae 2-5 poorly expanded, that of coxa 5 shortest.

Pleopods more or less similar to each other, peduncles elongate, each with 2 feeble rectinacula, rami subequal but inner with fewer articles; counts of outer

Fig. 1—*Warreyus maculosus* (Sheard), unattributed drawings=lectotype, female "a"; c= male "c"; d= male "d"; f= female "f"; g= female "g"; h= female "h".



and inner rami on pleopods 1-3 = 16-17 and 14 each; peduncles of pleopods 1-3 = 0.83, 0.90 and 0.80 as long, respectively, as rami, each peduncle at base of outer ramus with free lobe bearing seta.

Epimera 1-3 each with several anterior setae; epimera 1-2 each with long facial ridge, that of epimeron 2 strongly vertical but separate spinule row placed far anterior; epimeron 1 with sparse ventral setae; epimeron 2 with posteroventral tooth and 3 pairs of ventral spinules; epimeron 3 rounded posteroventrally, ventral spine count = 1-2-2.

Urosomite 1 with weak lateral tooth above insertion of uropod 1 and broadly bifid process between rami ventrally; dorsal hump broad and weak. Urosomite 3 with weakly convex posterodorsal margin and small sharp tooth posteroventrally in mid margin between peduncles of uropod 3. Peduncle of uropod 1 with 2 lateral and 2 medial setae at ventral edges projecting to show from lateral side, lower edge with setule pits bearing spines, dorsolateral margin minutely spinulate, medial margin with 4-5 thin spines; dorsolateral margin of uropod 2 with 4 spinules, medial margin with 4 thin spines; outer rami of uropods 1 and 2 slightly shorter than inner; all rami with asymmetrical pair of apical spines and 2 others, smaller, subapically; inner rami with 2 rows of dorsal spines, outer with one row of dorsolateral spines. Uropod 3 missing. Telson very short, apex truncate and sculptured bilaterally, each of the 2 scallops bearing 2 setules; each side of dorsum with pair of setules, middle with 2 rows of denticles (both sexes).

Cuticle covered with complex pattern of fingerprint striations seen under oil immersion, groups of striations forming fields among blank spaces, striations probably under SEM composed of imbricating serrated or toothed plaques.

REMARKS: The lectotype is abnormal compared with other females examined from the same sample in: 1, smallness of the tooth on urosomite 1 above uropod 1. 2, structure of right lacinia mobilis (presumably worn). 3, presence of a basofacial spine on article 6 of pereopods 5 and 6 in addition to the submarginal facial spine-seta at about M45. 4, large size—the largest individual of *W. maculosus* in the collections, either from South Australia or from New South Wales.

MALE "d" A SYNTYPE FROM SOUTH AUSTRALIA: Very similar to female, with similar eyes, gnathopods and antennae, but minute features of antennae better developed, generally with more aesthetascs and more turgid articles. Uropod 3 missing.

Article 1 of primary flagellum on antenna 1 with 2 sets of 4 aesthetascs each, article 2 with 4, then 3 each on swollen articles 3, 5; 4 on article 8, 3 each on swollen articles 11, 14, 17; 2 each on swollen articles 20, 23, 26, 29; one each on articles 32, 35 . . . n; large calceolus on each of articles 2, 3, 4, 6, 7, 9, 10, 12, 15, 16, 18, 19, 21, 22, 24, 25, 27, 30, 31, 32, 33 . . . n; large calceolus on each of articles 5, 8, 11, 14, 17, 20, 23, 26, 29. Small calceoli in anterior and posterior positions alternatively when on adjacent articles, all large calceoli, except that on article 13 in posterior position. Right antenna 1 aberrant basal-

ly. Antenna 2 flagellum with slight alternating turgidity pattern correlated with pairs of large calceoli occurring in tandem, large calceoli occurring one each on articles 3, 5, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31; small calceolus on each of articles 1, 2, 4, 6, 8, 11, 14, 17, 20, 23, 26, 29, 32, 33, 34 . . . n; thus large calceoli of articles 12, 13, and each pair thereafter, zig-zagging slightly.

Right lacinia mobilis with 3 main and 2 subsidiary teeth and facial boss (illustrated and supplementing description of female where it was worn off).

Coxae very poorly armed, lacking posterior setae or spines, ill-developed relative to female "a", typical of smaller females and juveniles. Coxa 1 with 6 long ventral setae; coxae 2 and 3 each with anteroventral setule, no other armaments; coxa 4 with 3 posteroventral short setae; coxa 5 with 2 anteroventral setules on anterior lobe only. Setae on article 6 of pereopods 5 and 6 as in female in one posterior group only, dactyl of "enlarged" variety contrasted with *W. latrans*.

Epimeron 2 ventrofacial spine formula = 1-1-1; epimeron 3 left side = 1-1-1, right side = 1-1-1-1-1.

Uropod 3 missing.

FEMALE "b": No basofacial spine on articles 5 of pereopods 5 and 6. Epimeron 2 ventrofacial spine formula = 1-1-1; epimeron 3 = 1-1; urosomite 1 tooth as large as in *W. latrans*; outer face of peduncle on uropod 1 without basal spines.

MALE "d": No basofacial spine on article 5 of pereopods 5 and 6. Epimeron 2 ventrofacial spine formulae = 1-1-1; epimeron 3 = 1-1-1-1; uropod 3 illustrated, spine count on lateral margin of outer ramus = 1-2-2-2.

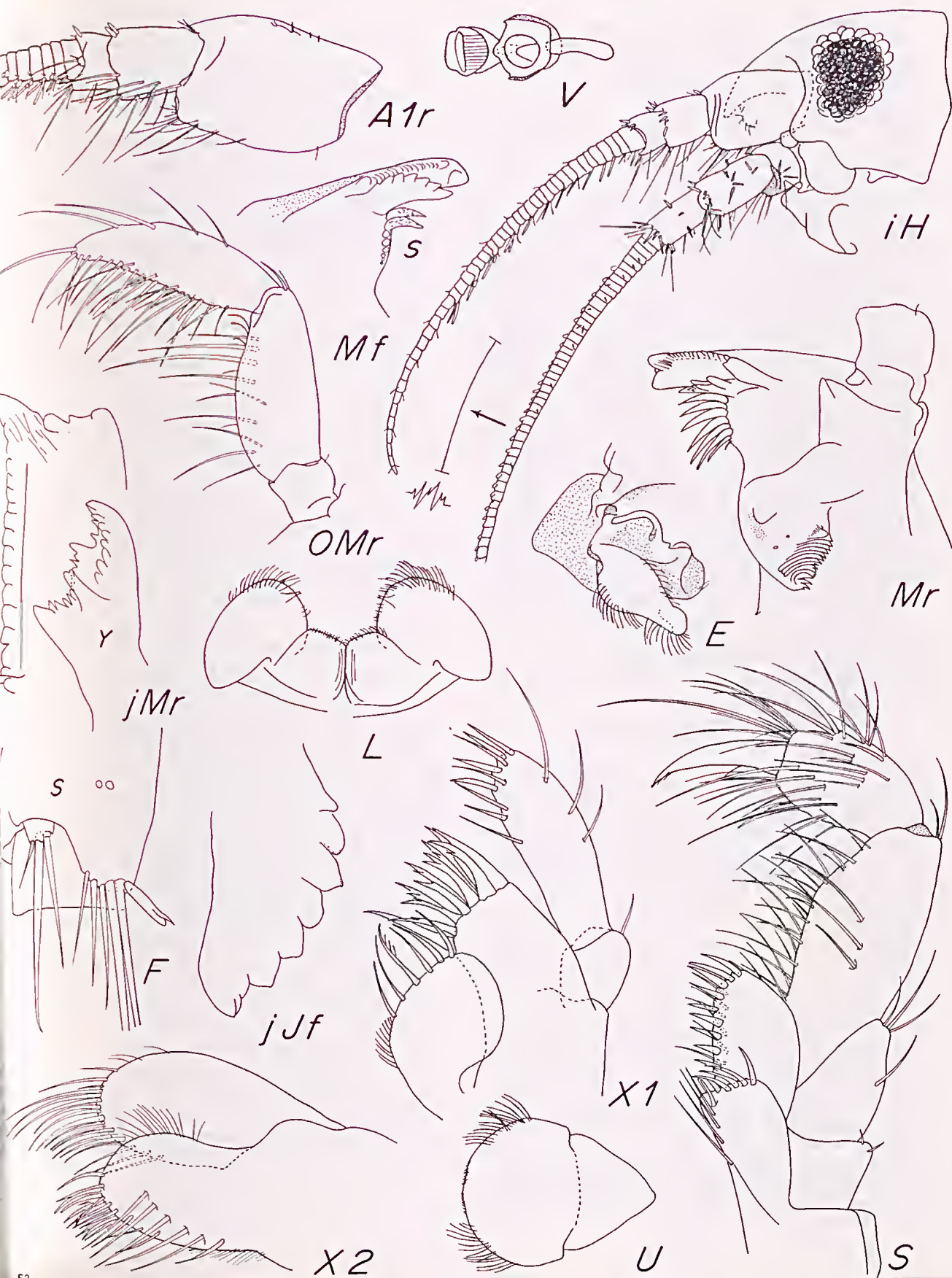
MALE "e": 2.08 mm, example also of small specimens; article 6 of pereopods 5-6 with only a few apicoposterior setae and no basofacial spine on article 5, dactyl of "large" form for *maculosus*; ventrofacial spine formula on epimeron 2 = 1-1, on epimeron 3 = 0-0-1.

FEMALE "f" 5.41 mm, OVIGEROUS FEMALE FROM TYPE LOCALITY: Article 5 of pereopods 5-6 with no basofacial spine, submarginal facial spine-seta longer on pereopod 6 than pereopod 5; inner plate of maxilla 1 bearing 11 setae; ventrofacial spine formula for epimeron 2 = 1-1-2-2; for epimeron 3 = 1-2-1-1.

LECTOTYPE: South Australian Museum C2105, female "a" 6.45 mm (newly designated and measured by us), formerly cotype. No holotype or other cotype found in Museum or elsewhere (courtesy of Dr. W. Zeidler). Illustrated herein, missing from specimen: apices of flagella on antennae; apices of pereopod 7; uropod 3. TYPE LOCALITY: Sellicks Beach, South Australia, 1936 coll. H. H. Hale.

OTHER MATERIAL: South Australian Museum C2109, syntypes from type-locality, female "b" 4.84; male "c" 4.44 mm (illustrated uropod 3); male "d" 4.85 mm; male "e" 2.08 mm; ovigerous female "f" 5.41 mm. National Museum of Victoria material, Port Jackson, New South Wales protected beach near Manly ferry wharf, coll. Dr.

Fig. 2—*Warreyus latrans* (Haswell), unattributed drawings = female "q"; i = female "i"; j = female "j".



D. M. Dexter 5 September 1980; 32 specimens, small, but with ovigerous females; female "i" 4.83 mm and subadult female "h" 4.3 mm illustrated. Eddystone Point, Tasmania, coll. Diane Higgins, April 1978, 5 specimens, female "g" illustrated.

RELATIONSHIP: Besides the generic characters cited above, *W. maculosus* differs from *E. fossor* in the following ways: 1, the acute and much longer rostrum. 2, short articles 2-3 of antenna 1. 3, slightly different calceoli. 4, broader inner lobes of lower lip (forcing stronger gape) and blunter mandibular lobes. 5, sparser setae on the inner plate of maxilla 1. 6, smaller maxillipedal plates. 7, truncate coxa 1. 8, the flatter, smoother blade of the incisor, not grossly toothed. 9, larger hands and shorter wrists (particularly in the female) of gnathopods. 10, thinner fifth article of pereopod 3-4, longer and thinner sixth article 2. 11, presence of long fine spine-setae on dactyl of pereopod 7 in addition to clumps of spines. 12, lack of lateral armaments on facial ridge of epimeron 1. 13, larger epimeron 2. 14, presence of tooth on epimeron 2. 15, presence of ventral spines on epimeron 3. 16, larger and apically bifid process on the posteroventral margin of urosomite 1 between peduncles, compared with the minute simple ovoid of *E. fossor*. 17, presence of dorsolateral spine row on peduncle of uropod 1. 18, shortness of outer rami on uropods 1 and 2. 19, stronger spination on uropods 1-2 and presence of second row of spines on inner rami. 20, greater length of uropod 3 relative to urosomite 3 and of its rami relative to peduncle. 21, presence of numerous outer spines on rami of uropod 3. 22, sculptured apex of telson.

DISTRIBUTION: South Australia to New South Wales, semi-protected and wave-beaten beaches, in sand.

Warreyus latrans (Haswell 1879)

Figs 2-4

1897 *Oedicerus latrans* Haswell p. 324, pl. 19, fig. 1.

DIAGNOSIS: Coxae 2-4 with ventral and posterior setae short and not divided into groups based on size; article 6 of pereopods 3-4 and 5-6 alike, facial spines in ranks of about 3 and 1, with row of single spines occurring on one margin in both sets of pereopods; dactyls of pereopods 3-6 alike, obsolescent; ventral tooth on urosomite 3 not vestigial.

DESCRIPTION OF FEMALE "q": 5.81 mm, New South Wales. General body form like *Exoedicerus fossor* (Stimpson) as shown by Barnard & Drummond (1982, p. 610, fig. 1); rostrum elongate, reaching almost to apex of article 1 on antenna 1 but head otherwise not galeate, lateral lobes narrow and submammilliform, anteroventral corner of head obtusely angled softly; eyes paired and large, each with massive pigment core and barely 1 or 2 rows of peripheral ommatidia (from lateral view) unpigmented. Antennae of medium length, 2 longer than 1, articles of flagella short and bead-like, proliferate, widened and lobed alternately only on antenna 1; peduncle of antenna 1 short, articles 2-3 successively much shorter than article 1, all three articles sparsely spinose and setose; peduncle of antenna 2 also short, ar-

ticles 4-5 subequal, article 3 short, all three sparsely spinose and setose; accessory flagellum unarticulate, small, scale-like; main flagellum of antenna 1 with complex arrangement of calceoli, swollen articles and aesthetascs, generally beyond article 12 every third article of maximum turgidity and bearing large calceolus and 1 or 2 aesthetascs, intervening 2 articles narrower, each bearing smaller calceolus and no aesthetascs; first four basal and articles 7, 9, 11 swollen, each swollen article generally with 2 aesthetascs, article 3—n each with calceolus (see formula for male "g" to follow, as undamaged example); flagellum of antenna 2 longer, thinner, no articles swollen, aesthetascs absent; except for article 1 each following article with small calceolus, after article 5 these calceoli alternating in zig-zag fashion from posterior to anterior position on medial face of apex of each article, but after article 16 pattern changing to 2 articles in sequence with anterior calceolus each followed by one with posterior calceolus, after article 26, pattern of 4 articles in row with calceoli gradually progressing from anterior to posterior position; formula for female "q" (using the symbols used for *W. maculosus*) as follows: 1-0, 2p, 3p, 4p, 5p, 6a, 7p, 8a, 9p, 10a, 11p, 12a, 13p, 14-0, 15a, 16p, 17a, 18a, 19p, 20a, 21a, 22p, 23a, 24a, 25p, 26-29 from a to p gradually, and following groups the same, 30-33, 34-37, 38-41, 42-45, 46-49, 50-53, 54-57, then broken after article 60.

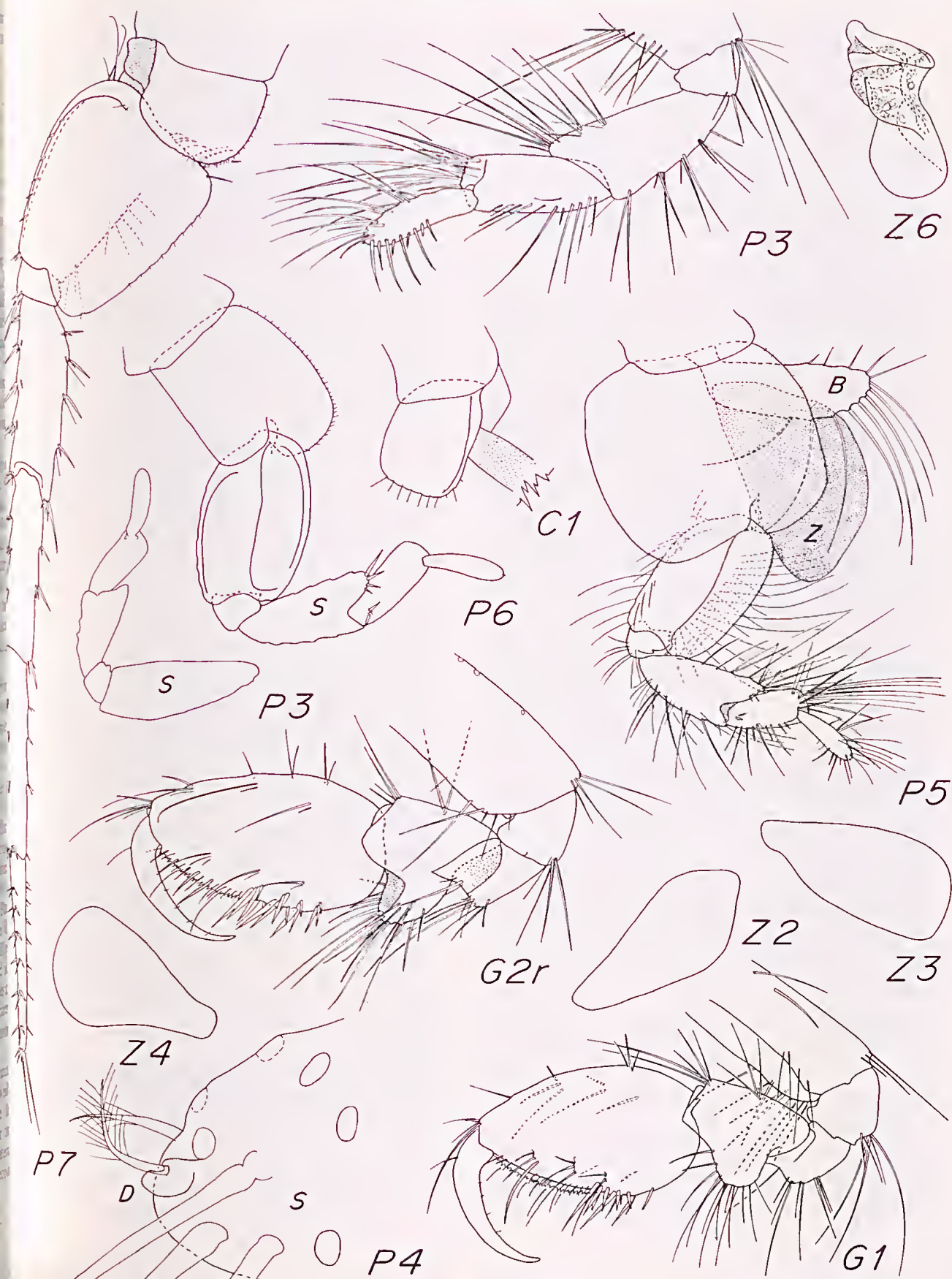
Calceoli generally of oedicerotid form 7 (Lincoln & Hurley 1981) but differing from those of *Exoedicerus fossor* in much smaller size, proximal receptacle being larger than part beyond waist, both receptacular elements being complexly sculptured, and proximal cup being larger relative to distal element.

Epistome with strong angular projection anteriorly, upper lip symmetrically rounded below. Incisors toothed, blade even, oblique; right lacinia mobilis complexly cuspidate and denticulate, left with 7 teeth; rakers stout, each side with 7 and 1 rudimentary; molar not very stout, subcuboid, moderately trititative; palp of medium thickness, article 1 short, article 2 weakly expanded, strongly setose, article 3 thinly falciform, longer than article 2, setae = ADE. Lower lip illustrated. Inner plate of maxilla 1 with 6 widely spread medial setae, but plate not densely setose; outer plate with 11 spines; palp moderately spinosetose, 2-articulate. Plates of maxilla 2 of medium breadth, subequal, inner with full oblique facial row of setae. Plates of maxilliped small, inner with medial margins appressed and bent orally, setose, apices each with 2 stout medial spines and several larger more lateral stiff setae; outer plate scarcely larger than inner, medially spinose; dactyl unguiform with 2 small subapical accessory setules.

Coxa 5 scarcely shorter than coxa 4. Coxa 1 truncate and setose ventrally; coxae 2-7 each strongly to weakly setose posteriorly; coxa 4 scarcely excavate and posteriorly lobate. Gnathopod 2 slightly larger than gnathopod 1, both slightly twisted in preserved material.

Setae on article 6 of pereopods 5-6 like pereopods

Fig. 3—*Warreyus latrans* (Haswell), female "q".



3-4, divided into two groups of ranks in 3-1 order. Dactyls of pereopods 3-6 vestigial, scarcely as thick as, and much shorter than neighbouring spines, each dactyl with large setule. Article 2 of pereopods 5-6 with midfacial ridge, and of pereopods 5-7 with anterofacial ridge; article 5 of pereopods 5-6 with 2 basofacial spines and submarginal facial spine-seta at about M45, that of pereopod 6 longer than that of pereopod 5. Dactyl of pereopod 7 well developed, with marginal triads of spines; middle element of each posterior triad a spine-seta, much finer and longer than the other two; apex with a few medium setae.

Gills present on coxae 2-7, flat, unpleated, with transverse capillaries, gills of coxae 2-5 chisel-shaped, of 6-7 folded and projecting medially into brood space like dried leaves. Oostegites on coxae 2-5 poorly expanded, that of coxa 5 shortest.

Pleopods similar to each other, peduncles elongate, each with 2 feeble rectinacula; rami subequal but inner with fewer articles, counts of outer and inner rami on pleopods 1-3 = 18 and 15 each; peduncles of pleopods 1-3 = 0.98, 0.90 and 0.70 as long as rami respectively; each peduncle at base of outer ramus with free lobe bearing seta. Epimera 1-3 each with several setae; epimera 1-2 each with long facial ridge, that of epimeron 2 strongly vertical but separate spinule row placed far anterior; epimeron 1 with sparse ventral setae, epimeron 2 with posteroventral tooth and 3 pairs of ventral spinules, epimeron 3 rounded quadrate posteroventrally, ventral spinules = 1-2-2-2.

Urosomite 1 with weak crescentic tooth above insertion of peduncle on uropod 1, bifid tooth between peduncles ventrally, dorsal hump broad and weak; urosomite 3 with tooth on mid posteroventral margin between peduncles of uropod 3, posterodorsal margin broadly and shallowly convex above base of telson, peduncle of uropod 1 with 3 medial setae projecting to show from lateral view, lower edge with setule pits, dorsolateral margin minutely spinulate, medial margin with 5-6 thin spines; dorsolateral margin of peduncle on uropod 2 with 5 spinules, medial margin with 4 thin spines; outer rami of uropods 1-2 slightly shorter than inner, all rami with asymmetrical pair of apical spines and 2 subapical; inner rami with 2 rows of dorsal spines, outer with one row of dorsolateral spines. Peduncle of uropod 3 elongate (see figure for spine arrangement); rami broadly lanceolate, alike, medial margins strongly setose; lateral margin of inner ramus setose, outer margin of outer ramus and inner margin of inner ramus spinose; formula for outer left ramus = 1-1-2-2-2-2, for right = 2-2-2-2-2-2. Telson very short, apex truncate and bilaterally sculptured, with 2 scallops each bearing 2 setules, each side of dorsum with pair of setules, middle with 2 rows of denticles (present on both sexes, though often sparse).

Cuticle with complex pattern of fingerprint striations (seen with oil immersion), groups of striations forming fields among blank spaces, striations probably composed of imbricating serrated or toothed plaques (when seen under SEM).

FEMALE "i" (5.25 mm, ovigerous): Generally like female "q" but epimeron 3 ventral spine formula = 1-2-2 (only); lateral spines on outer ramus of uropod 3 = 1-2-2-2-2-2. Aesthetascs on primary flagellum of antenna 1, article 1 = 2 + 1, then 2 each on articles 2, 4, 8, 12, 22, then one each on articles 3, 6, 10, 15, 18, 25, 28, 32, 35, 38, 41 (43 broken); calceoli on articles 5, 7, 9, 11, 13, 16, 19, 23, 26, 29, 33, 36, 39, 42 (broken); p on articles 2, 3, 4, 6, 8, 10, 12, 14, 15, 17, 18, 20, 21, 22, 24, 25, 27, 28, 30, 31, 32, 34, 35, 37, 38, 40, 41 (broken); swollen articles = 2, 3, 4, 6, 8, 10, 12, 15, 18, 22, 25, 28, 32, 35, 38, 41 (broken).

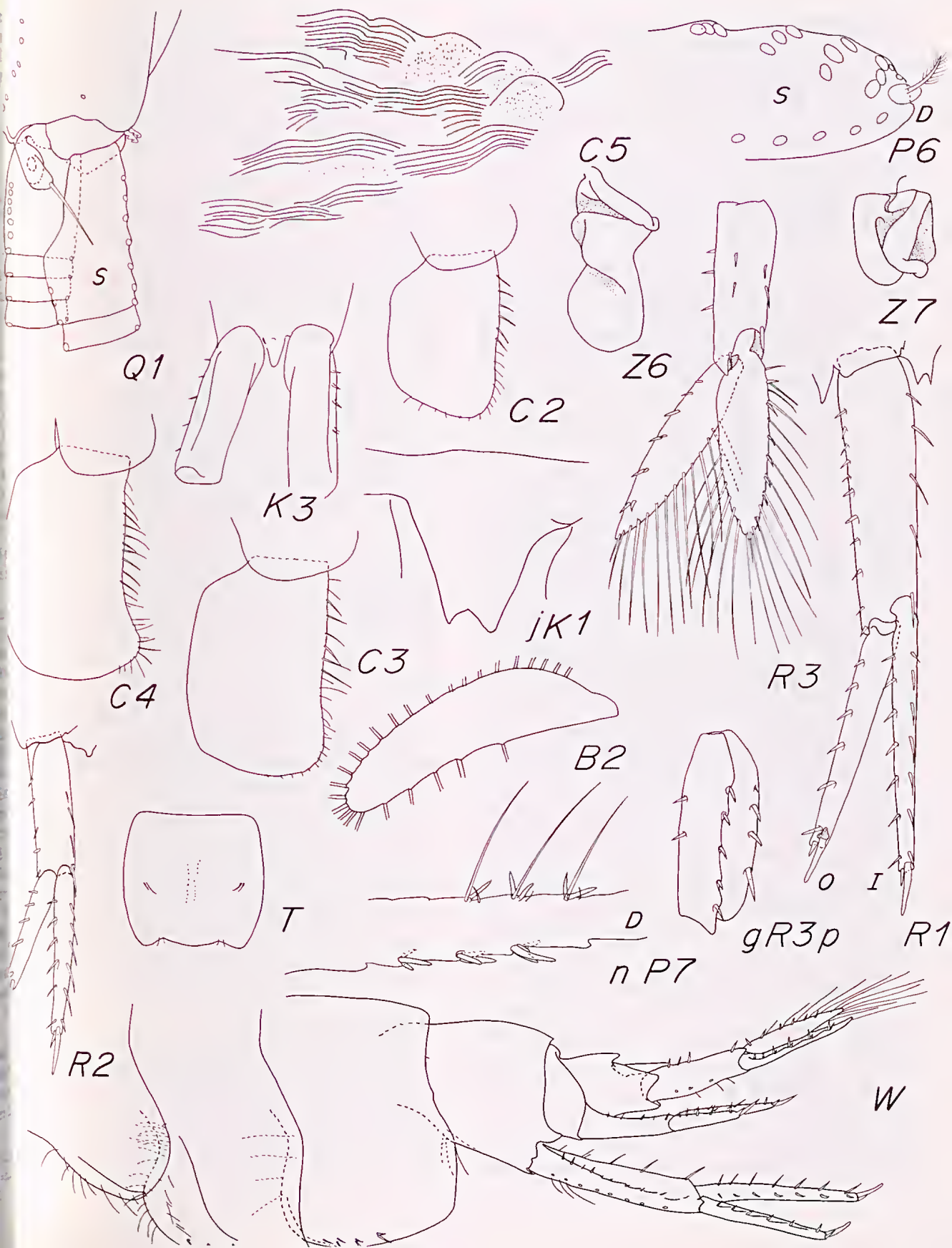
MALE "g" (5.79 mm): Very similar to female, with similar eyes, gnathopods, antennae and uropods, but minute features of antenna better developed, generally with more aesthetascs and more turgid articles; peduncle and uropod 3 more spinose. Article 1 of primary flagellum on antenna 1 with 2 sets of 4 aesthetascs each, articles 2-5 each with 4, then 3-4 each on swollen articles 6, 8, 10, 12, 15, 18, 21 . . . ; large calceolus on each of articles 4, 5, 6, 8, 10, 12, 14, 15, 18, 21 . . . ; small calceolus on all other articles from and including article 7. Antenna 2 flagellum with slight alternating turgidity pattern correlated with enlarged aesthetascs generally on articles 5, 7, 9, 12, 15, 18, 22, 26, 29, 33, 36, 39, 41, 44, 48, but turgidity not well correlated after article 39; small aesthetascs on articles 2, 3, 4, 6, 8, 9, 11, 13, 14, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 31, 32, 35, etc.

TYPE LOCALITY: Bondi Beach, New South Wales, intertidal surf zone.

OTHER MATERIAL: NMVJ3798-3810—Pambula, New South Wales, 7 December 1978, collected by M. M. Drummond, female "q" 5.81 mm (illus.), female "i" 5.25 mm (aesthetascs illustrated) female "j" 6.76 mm + 33 other specimens. Mallacoota, Victoria, intertidal surf zone, 9 December 1978, coll. M. M. D. Male "g" 5.79 mm (illustrated) + 38 other specimens. Lakes Entrance, Victoria, intertidal surf zone, 10 December 1978, coll. M. M. D. 28 specimens (smallest male 4.0 mm). WPBES stations 1714, 1715, Western Entrance, Western Port, 5 specimens. Kilcunda Beach, near San Remo, Victoria, intertidal surf zone, 16 September 1976, coll. Dr. J. K. Lowry and Dr. G. C. B. Poore, 50+ specimens (largest male, 9.5 mm). Woolamai Beach, Phillip Island, Victoria, intertidal surf zone, coll. J. K. L. and G. C. B. P., 16 September, 1976, 63 specimens, male "n" (illustrated). Waratah Bay, Victoria, intertidal surf zone, 30 October, 1976, coll. G. C. B. P., 200+ specimens, male "k" illustrated. In sand on beach east of Burying Ground Point, Southport, Tasmania, coll. T. M. Walker, 20 October, 1976, 30 specimens.

REMARKS: There must be some element of doubt in the positive identification of any taxon with a species of which the original material, including types, cannot be found. The *Warreyus* species described here closely

Fig. 4—*Warreyus latrans* (Haswell), unattributed drawings = female "q"; g = male "g"; j = female "j"; n = male "n"; CS = cuticle of coxa 5, highly magnified.



resembles Haswell's *O. latrans* as far as one can judge (as far as it is possible to tell) from the original short description and meagre illustrations, except for the fact that in Haswell's figure (1879, fig. 1g) of gnathopod 2 the wrist appears shorter and broader than in our material. However, Dr. J. K. Lowry of The Australian Museum informs us that the extensive survey by Dr. Deborah Dexter of a series of beach sites in New South Wales, including sites close to the type locality of *O. latrans*, provides an adequate basis for predicting that no further species resembling *latrans* could be expected to be found there; and that it may be safely assumed that the material described here belongs to that species.

Dr. Dexter's collection became available to us after completion of this manuscript, and specimens from it which we have seen from various exposed beach sites as far north as Seal Rocks (mid-coastal New South Wales), and the single male specimen lately collected at the type locality by Dr. Lowry, appear to be identical with those described here from Victoria and southern New South Wales. A neotype should be erected after systematic study of fresh material from Haswell's type locality. It is outside the scope of this paper.

RELATIONSHIP: It differs from *W. maculosus* in the similarity of articles 6 and 7 of the two groups of pereopods 3-4 and 5-6. In *W. latrans* the facial spines on article 6 of pereopods 3-6 are divided into 2 groups in ranks of about 3-1, the rank of 1 forming a marginal row; and the dactyl of pereopods 3-6 is obsolescent; in *W. maculosus* articles 6-7 of pereopods 3-4 are like those of *W. latrans*, but on pereopods 5-6 the dactyls (article 7) are much larger, and the spines on article 6 are arranged in one facial rank with no separate marginal row; the formula thus being cited as 4-0. Further differences from *W. maculosus* are to be found in: the larger posteroventral tooth on urosomite 3 between the peduncles of uropod 3; the two stout basofacial spines on article 5 of pereopods 5-6 compared with the single spine in the lectotype and the absence of spines in other specimens of *W. maculosus* examined; the presence of an anterior group of setae on the wrist of *W. latrans* though the wrist itself is less well developed than that of *W. maculosus*; the shape of the posteroventral bifid process separating the uropodal peduncles on urosomite 1, tall and shallowly bifid in *W. latrans* short and broadly bifid in *W. maculosus*; shape of the inner plate of maxilla 1 (much rounder in *W. latrans*) and the fewer setae borne upon it—usually 5-7 in spite of its larger size, compared with the eleven most commonly present on *W. maculosus*. In both species female coxae are much more setose than those of the male, in which they are frequently reduced to one or two, or are absent altogether; and the density of setation in the females themselves from the same sample varies dramatically with the size (presumably the stage of development?) of individuals of both species so that comparison of the two in respect of setosity of coxae is not feasible.

DISTRIBUTION: Exposed ocean beaches from south-eastern Victoria to midcoastal New South Wales, sand.

NOTE ON A POSSIBLE NEW SPECIES OF *WARREYUS*

Differences between populations of *W. latrans* from different localities in respect to numbers of setae and spines, subtle variations in conformation of coxae, pereopodal articles and epimera are considered insufficient to warrant specific differentiation. Frequently they are related to body size, which varies so much from one locality to another.

However, three small specimens (one male, one subadult male and one subadult female) from Western Port (WPBES stations 1714 and 1715) resemble *W. maculosus* in the absence of anterior setae on the wrist of gnathopod 2, but resemble *W. latrans* in the presence of both anterior and posterior setae on article 6 of pereopods 5 and 6. The rostrum is longer than that of either *W. maculosus* or *W. latrans*, and the pincer-like apex of the ventral tooth on the first urosome is distinctive.

At the time of examination, evidence from these three rather poor specimens was considered inadequate to supply a firm basis for the establishment of a separate species, but samples just to hand from Werribee (Port Phillip Bay) appear to be identical with them and further investigation may confirm a third species of *Warreyus*.

Exoedicerus fossor (Stimpson 1856)

Fig. 5

1856 *Oedicerus fossor* Stimpson, p. 349.

1879 *Oedicerus arenicola* Haswell, p. 325, pl. 24, fig. 3.

1906 *Exoedicerus fossor* (Stimpson); Stebbing, p. 239.

1982 *Exoedicerus fossor* (Stimpson); Barnard & Drummond, p. 611, figs 1-5.

REMARKS: Barnard & Drummond (1982) listed many differences between *Exoedicerus fossor* and *Warreyus maculosus*, and assigned *maculosus* to the genus *Exoedicerus*, but further examination of *maculosus* and study of *latrans* confirm the generic discontinuity of *Exoedicerus* and *Warreyus*. In Fig. 5, some additional, more detailed illustrations are given of *E. fossor*: 1, highly magnified details of incisors (J) and laciniae mobiles (Y) which may be compared with similar views for the two species of *Warreyus* in Fig. 1, hMr and dMr. 2, views of the dactyl on pereopod 7(D) show lack of setae, cf *Warreyus* Fig. 2 fD7 and Fig. 4 nP7. 3, a ventral view of the posterior margin of urosomite 1 (xKl) illustrates the small size of the ovoid projection between the uropodal peduncles compared with the much larger and more elaborately shaped structures in *Warreyus* as shown in Figs 1 fKl, iKl, Kl and 4 jKl.

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Fig. 5—*Exoediceros fossor* (Stimpson), q = male "q"; u = male "u"; x = female "x"; y = male "y".

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